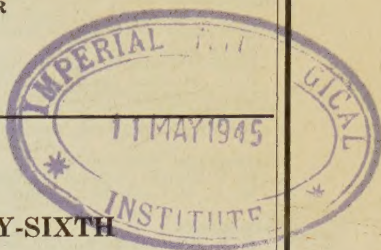


TEXAS AGRICULTURAL EXPERIMENT STATION

A. B. CONNER, DIRECTOR
College Station, Texas



**FIFTY-FIFTH AND FIFTY-SIXTH
ANNUAL REPORTS
1942-1943**

**AGRICULTURAL RESEARCH SERVES
FARMERS, RANCHERS AND
INDUSTRY**



AGRICULTURAL AND MECHANICAL COLLEGE OF TEXAS
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December 1, 1944

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The Texas Agricultural Experiment Station at the Agricultural and Mechanical College of Texas and its substations and laboratories in the principal agricultural regions of the state serve directly farmers, ranchers, industry and commerce, and business in general.

In this report covering two years work, is found a brief statement of progress, results, and implications presented in understandable form. No attempt has been made to enumerate all the different lines of research in progress which may later develop useful results.

The material presented herein will illustrate the work of the Agricultural Experiment Station and its relationship to the welfare of citizens, regardless of occupation.

Many of the developments of agricultural research such as, for example, the development of the combine types of grain sorghum, can have a profound influence not only upon the welfare of citizens engaged in agriculture but also of citizens engaged in commerce and industry. The increasing general use of combine sorghums in West Texas and in the Corpus Christi area in South Texas is an example of service which leads to the reductions of cost in the production of grain and to the processing of the product before and after it enters the channels of trade.

The far-reaching results of agricultural research can hardly be estimated, but in the rapidly changing world in which we live we can follow no safer course than to base our procedure and plot our course on established facts.

AGRICULTURAL RESEARCH SERVES FARMERS, RANCHERS AND INDUSTRY

A. B. CONNER

The Development of Waxy Kafir Furnishes a Source of Tapioca Flour

A strain of waxy kafir has been developed at the Lubbock and Chillicothe Substations which yields approximately 67 per cent of the particular form of starch previously supplied largely from the East Indies from cassava. This type of starch, which stains red with iodine in contrast to blue in the ordinary type of starch, is used extensively for food purposes and for making high-speed sticker glues for packaging and wrapping innumerable materials including ammunition and many other products which require packaging. Waxy kafir types which are suitable for harvesting with the combine have already been developed and will shortly be in production. Twenty thousand acres of this waxy kafir was grown in the vicinity of Lubbock in 1943. Its production may easily lead to the establishment of industrial plants for extracting the starch and by-products in and near areas of production.

Karper and Quinby.

Combine Types of Grain Sorghum Save Labor

Four combine types of grain sorghum, Plainsman, Caprock, Bonita, and Early Hegari, have been developed and put into production by the substations at Lubbock and Chillicothe. It is estimated that two men with a small farm type of combine can do the work of ten or twelve men required in the ordinary method of harvesting grain sorghum. This makes possible the production of sorghum grain at a greatly reduced cost to the grower. Grain sorghum is used extensively as feed for livestock and particularly for poultry. It is also used in the manufacture of industrial alcohol. The net effect of this development gives to the grain sorghum region an unusual opportunity in extending the economical production of this grain for the many uses in the present emergency and in the future.

Karper, Quinby, and D. L. Jones.

Fertilizers for Irish Potatoes in Northwest Texas

In a fertilizer test on irrigated land, at Substation No. 8, Lubbock, involving different amounts of nitrogen, phosphoric acid and potash, it was found that nitrogen gave larger increases in yields of potatoes than either phosphoric acid or potash. The largest amount of nitrogen used, 48 pounds per acre, made the largest yield. The results indicate that 48 pounds of phosphoric acid and 24 pounds of potash per acre are also needed. The application of 600 pounds per acre of 8-12-4 fertilizer made the largest profit, \$81.00 per acre, and the greatest return per dollar invested in fertilizer was \$7.79.

W. L. Jones and D. L. Jones.

Suitable Pollenizers for the Bruce Plum

The partial sterility of the widely-planted Bruce plum is sometimes overcome naturally through interpollination with the native Chickasaw thicket plum. Where these do not occur it is advisable to interplant every few rows with another commercial variety. Methley, Shiro, and Wickson have been found to be among the best for this purpose. Other less desirable varieties that can be used include Cumberland, Eagle, and Wild Goose.

Flory.

Increasing the Acre Yield of Grapes

Some 19 varieties of grapes yielded better at the Fruit Investigations Laboratory at Montague than either Carman or Virginia, the two now grown commercially. Augustine, LeNoir (Black Spanish), Favorite, and Beacon produced the heaviest yields. Carman produced 1200 pounds more fruit on an acre basis when grafted on Dog Ridge than when on its own roots. Excellent response has been obtained from the application of superphosphate in combination with either nitrogen or potash on Carman grapes. Both yield and quality were improved. Blends of grape juice made at Substation No. 3, Angleton, from materials produced at the Fruit Laboratory are being received favorably by the trade and seem to have wide possibilities of development.

Randolph and Reed.

Breeding Citrus for Hardiness to Cold

Seedlings of citrange (trifoliolate x sweet oranges) and citrumelo (trifoliolate orange x grapefruit) hybrids exhibiting segregation for leaf type have shown wide differences in cold hardiness at College Station. On a basis of 1 (most tender) to 10 (hardest), seedlings of No. 1425 citrange were rated from 1.5 to 9.0 after the 17° F. temperature on March 3, 1943. There was little difference in hardiness between the two types of hybrids. Deciduous trees tend to be more hardy than the partially evergreen.

Yarnell.

Improved Citrus Rootstocks for the Lower Rio Grande Valley and for the Winter Garden Region

In the Winter Garden area certain of the citranges and the trifoliolate orange are giving good results as rootstocks with varieties of the Satsuma orange. These include seedlings of Carrizo, Cunningham, Morton, Rusk, Rustic, and TS 15137 citranges. Poor results were obtained with sour orange, calamondin, citrangedin, citrumelo, lemon, and Savage citrange roots. In the Lower Rio Grande Valley rootstocks of the tangerine promise to give better results than the sour orange so extensively used now commercially.

Mortensen and Friend.

New Hybrid Dewberries

A preliminary distribution of five selections of hybrid dewberries has been made to interested nurserymen. These are early, vigorous, and productive large-fruited types that have blood of the Nessberry. One selection, R 40-202, produced at the rate of 1000 pounds of fruit per acre in five pickings during May at College Station. R 40-51 has done well in the Winter Garden area. Additional selections from intervarietal crosses made at Substation No. 11, Nacogdoches, are ready for wider testing.

Yarnell and Morris.

Method of Growing Papayas Developed

A method of growing papayas as an annual crop has been developed by the Weslaco Station. This method consists of starting the seedlings (from sib pollinated fruits) in a glass covered hotbed in mid-winter, transplanting during April, forcing growth by the generous use of water and fertilizer, adequately controlling nematodes, and harvesting at the slightly turbid latex stage of maturity. Hawaiian Solo and Betty are the varieties best adapted for Valley planting.

Friend.

Phosphate Is Necessary for Many Pastures and Ranges

(In cooperation with the Tennessee Valley Authority and the King Ranch)

Work conducted at Angleton, Beaumont, Tyler, and the King Ranch near Falfurrias during the last several years has shown definitely that the application of phosphoric acid is necessary for the successful establishment of adapted pasture legumes in the Gulf Coast Prairie and eastern Texas.

At Angleton in a seeding of pasture grasses and clovers on Lake Charles clay in 1943 the application of 80 pounds of P_2O_5 per acre in Tennessee Valley Authority superphosphate produced an abundance of white clover. Where phosphate was not applied the clover was a failure. During the last seven years the treatment of 80 pounds of phosphoric acid per acre made an average yield of 4265 pounds of air-dry forage per acre, or 54 per cent more than the yield of 2763 pounds from the unfertilized pasture. This treatment also nearly doubled the phosphoric acid content of the forage in 1943.

At Beaumont the application of 32 pounds of P_2O_5 per acre in 160 pounds of 20 per cent superphosphate on pasture on Crowley clay made an average yield of 3286 pounds of air-dry forage per acre in 1942 and 1943, which was 54 per cent more than the yield of 2131 pounds from the unfertilized plots. Superphosphate was more effective than nitrogen, potash, or lime. The application of a complete fertilizer (400 pounds of 4-8-4 per acre) and one ton of lime, however, made the largest yield, 5047 pounds of air-dry forage per acre, or nearly two and one-half times as

much as the yield from unfertilized plots. The application of phosphate increased the phosphoric acid content of the forage 50 per cent.

On the sandy soils at Tyler nitrogen and potash have more effective than superphosphate in increasing the yield of pasture forage probably because the vegetation consisted mostly of Bermuda grass.

At King Ranch, Falfurrias, during the two years 1941 and 1942, the application of approximately 150 pounds of TVA superphosphate per acre to the 640-acre pasture increased the yield and feeding value of the pasture grasses so much that the rate of stocking was increased by 50 per cent over the unfertilized pasture. As a result, beef production per acre was greatly increased and more calves were raised. The grasses on the fertilized plots contained .51 per cent of phosphoric acid, which is considered adequate for livestock, and the grasses on the unfertilized plots contained only .24 per cent, which is not sufficient for normal growth of range cattle.

These results show that application of phosphate greatly increased the yield and feeding value of the pasture grasses in eastern Texas and all along the Gulf Coast to southern Texas. They indicate that phosphate may be applied to advantage on pastures throughout this vast region. In view of these favorable results farmers and ranchmen in that part of the state are beginning to apply phosphate to their pastures.

Reynolds, Fraps, Hensel, Johnson, Stansel, and Wyche.

Wintering Stocker Beef Calves Under South Plains Farm Conditions

(In cooperation with Texas Technological College)

Beef steer calves wintered during a 138-day period showed better average gains from the use of sorghum fodder roughage than from either silage or native buffalo-blue grama pasture as forage. All groups received 1.1 pounds of cottonseed cake and 2/3 pound of alfalfa hay per head daily.

The sorghum fodder group made an average daily gain of 1.07 pounds, the sumac silage group .82 pound and the buffalo-blue grama pasture group .75 pound.

Stangel and J. M. Jones.

Rice Fertilizers

Rice fertilizer tests conducted by Substation No. 4 at Beaumont for a number of years show that a fertilizer supplying 20 pounds per acre each of nitrogen and phosphoric acid is a profitable application for rice on the principal soils of the area. Fertilizer drilled in with the seed has increased the yield of rice approximately 15 per cent as compared with broadcast application on top of the soil.

Recent tests on farms at different locations over the region has resulted in an increase in the number of farmers that use fertilizers on rice. The

general practice is to use a fertilizer carrying more nitrogen than was used in former years. Practically all growers are now using drills with fertilizer attachments for placing the fertilizer in the drill with the seed.

Wyche.

Losses of the B Vitamins in Roasting Beef

The losses in B vitamins in the process of roasting beef are partly caused from heat and partly from drippings from the roast due to the fact that the vitamins, thiamine, pantothenic acid, riboflavin, and nicotinic acid are water soluble. The losses in well-done beef were: thiamine, 31 per cent; pantothenic acid, 25 per cent; riboflavin, 23 per cent; and nicotinic acid, 21 per cent.

Cover.

Core Sampling of Texas Wools for Shrinkage Determinations

(In cooperation with the U. S. Department of Agriculture and the Commodity Credit Corporation)

Small core samples from 13 lots of Texas wools were forwarded to Washington for scouring and when compared with actual shrinkage of the lots from which the cores were taken, totaling some 29,000 pounds scoured in the Texas A. and M. College Wool Laboratory, showed close agreement and indicated that notwithstanding the fact that our Texas wools are neither skirted nor classed previous to bagging the core method offers possibilities for obtaining accurate shrinkage determinations on Texas wools.

Davis and J. M. Jones.

Determining Shrinkage of Mohair

(In cooperation with Texas Extension Service)

The average shrinkage of No. 2 grade and No. 3 grade Texas mohair was found to be approximately 14 per cent on a total of 60,000 pounds scoured. The shrinkage on grade No. 3 was approximately .5 per cent lighter than the shrinkage on No. 2 grade.

Davis, Nisbet, and Garth.

Beef Cattle Production on East Texas Improved Pastures

Beef cattle at the Lufkin Station on improved pastures have attained normal growth and development evidencing that the forage on improved pastures in this area carries the necessary elements for growth and development of livestock.

The most critical period is the winter maintenance from mature cows, and this requires about 175 pounds of protein supplement and 1200 pounds

of dry roughage per head fed during the period from December 1 to March 15.

Maintaining the cows on improved pastures with some supplemental feeds has averaged 1167 pounds in weight, and these cows have produced calves that have weighed from 350 pounds to 400 pounds at six months of age.

The chemical analysis of forage on the improved pasture shows adequate calcium and phosphorus for beef cattle during the greater portion of the year and that during this period bone meal is not consumed if offered the cattle, nor is it needed. These cattle have consumed an average of 22 pounds of salt per head each year over a five-year period.

Crouch and J. H. Jones.

Culling Sheep for Increased Wool Production

A progeny test showed that only 11.3 per cent of the Rambouillet sires used increased both the clean fleece weight and the length of staple of the wool.

Since a small percentage of the sires used, increased both clean fleece weight and length of staple, it is obvious that progeny testing is necessary rather than promiscuous culling if both the clean fleece weight and length of the staple are to be improved. Progeny testing is tedious but lends itself to more rapid progress in improving the flock for clean fleece weight and staple length than other methods.

J. M. Jones, Warwick, and Dameron.

Progress Made in Breeding Sheep and Goats Resistant to Stomach Worms

The breeding of sheep and goats for resistance to stomach worms (*Haemonchus contortus*) has been progressive in that during the past four years groups of lambs sired by resistant rams of an unselected group showed 17 per cent less mortality among lambs from the resistant parents than among those from the controlled group. Both groups were handled as units, and no medical treatment of any kind was used on these lambs.

Similarly in goats, two bucks which showed resistance and were mated to does not tested for resistance showed 52 per cent less mortality in kids of the selected sire group than in the group from sires which have not been tested for resistance.

Though it has not been possible to concentrate the genes responsible for resistance in sheep or goats for true breeding resistance, some progress in this direction has been made.

Warwick, Turk, Berry, and Schmidt.

Calcium Supplement and Oat Grazing Beneficial to Production, Health, and Vigor in Milk Cows

Feeding tests with Jersey milk cows continue to show benefits from the addition of limestone or oyster shell of the grain ration. The benefit is expressed in somewhat greater production and generally better health and vigor. The grazing of fresh oats, vetch, or a combination of the two by dairy cattle during the fall and winter has stimulated milk production more than any other factor. Increases have resulted in the daily average production per head from 4 to as much as 5½ pounds for the period when such grazing was available.

Copeland.

Cytological Studies with Sheep and Goats

The wild Mouflon sheep has been considered one of the progenitors of our present domestic breeds. Genetic evidence that this is especially true in the case of the Merinos and Rambouilletts is based on the inheritance of hornlessness at this station. This is confirmed by studies just completed comparing the chromosomes of Rambouilletts with those of the Mouflon. The chromosome complex of these two species is the same. Each has three pairs of large V's and the same number of pairs of chromosomes. This points to the relatively stable nature of the chromosomes of the genus *Ovis*, as there had probably been no intercrossing of these stocks since Neolithic times.

Berry and Warwick.

Rations for Developing Registered Bull Calves

The results of a 71-day feeding test indicate that rations consisting of 2 to 2½ pounds of cottonseed meal, 5 pounds of alfalfa hay and 9 to 12 pounds of ground hegari bundles will produce satisfactory growth and gain for weaned bull calves. This ration produces growth and bone development in young bulls for range service. Significant differences in gain were noted between the progeny of different sires. The work is to be continued on a cooperative basis as it promises to benefit both the feed producer and the ranch breeder who may either sell or use the bulls.

Bayles and J. H. Jones.

Prevention of Urinary Calculi in Cattle

Feeding a relatively high level of calcium in the form of pulverized oyster shell or pulverized limestone in fattening rations consisting of ground threshed milo, cottonseed meal, and sumac sorghum silage to steer calves, decreased quantity of urinary calculi but also decreased weight

gains. Bone meal fed in relatively high quantity decreased urinary calculi but increased weight gains and finish in two out of three trials. Feeding high levels of magnesium significantly increased the amount of urinary calculi in two separate tests.

J. H. Jones, Keating, and J. M. Jones.

Gains of Steers on Different Kinds of Pasturage

Starting with 450-pound feeder steer calves in November, creditable slaughter yearlings were produced from the forage resources alone on the Amarillo Station in 316 days. Wheat pasturage contributed an important part of total gain, or 184 pounds per head in the 149-day wintering period. Gains in the summer grazing period of 167 days, April 14 to September 28, on different kinds of pasturage exceeded the winter gain.

The 10 steers comprising the best gaining and most fleshy group gained 301 pounds per head or 1.80 pounds daily in the summer period. They were grazed throughout on native grass lake pasture which afforded abundant forbs in the dry lake bed. A group grazed on the lake pasture except for 56 days in midsummer when they were placed on Sudan grass averaged 1.73 pounds daily. A group grazed on re-seeded areas of native and tame grasses averaged 1.34 pounds daily. A group grazed on native blue grama and buffalo grass pasturage throughout averaged 1.43 pounds daily and had less finish than any other group at the close.

Early spring pasturage produced good gains. Western wheat grass was a valuable addition to early spring grazing. A high grazing value was indicated for forbs in native pastures, and it was shown that re-seeded areas may yield good pasturage. Steers grazing the re-seeded pastures preferred the grasses which were struggling for establishment to those which were well established. The first year's results show that pasturage in the area may be highly productive and that in years favorable for wheat production, pasturage may be available for a long period.

J. H. Jones, Porterfield, and J. M. Jones.

Improved Devil's Shoestring, A Good Source for Rotenone

The rotenone content of Devil's Shoestring, (*Tephrosia virginiana* (Linn)), has been increased by careful selection and breeding until it is now possible to grow a product from seed containing 3 per cent rotenone. Selections have been obtained in which the rotenone content runs from 5 to 9 per cent. Harvesting the roots is now the main problem. Tractor-pulled "rose lifters" and potato diggers are being tested. Yields of 750 to 1000 pounds of dried roots per acre appear possible. Harvesting should take place during the blooming-seeding period.

Little and Russell.

Observations on the Cattle Grub in Feeder Steers

(In cooperation with Bureau of Entomology, U.S.D.A., and Texas Extension Service)

Sixty yearling steers were examined for cattle grubs on four dates: November 13, December 15, January 20, and February 17. An average of 32 grubs were found per steer. The 30 heaviest steers had an average of 26 grubs while the 30 lightest ones averaged 38 grubs. Grub infestation as found, apparently did not affect summer gain for the 30 most heavily infested steers gained 185 pounds as compared to 175 pounds for the 30 most lightly infested. The destruction of the grubs during the fattening period, either by extraction with forceps or by scrubbing with cubé wash apparently did not affect gain. The steers did not show ill effect from the treatments used. When the steers were slaughtered June 1, the carcasses showed no evidence of grub damage and no difference could be observed in the hides between treated and untreated steers.

J. H. Jones, Dickson, and Johnston.

Supplying Phosphorus Supplements to Range Cattle in South Texas

(In cooperation with Bureau of Animal Industry, U.S.D.A., and the King Ranch)

Experiments begun on the King Ranch in 1937 have shown that the range vegetation in South Texas is deficient in phosphorus and that breeding herds when fed phosphorus supplements show marked improvement in condition, weight, and percentage calf crop. With the object of evaluating methods of supplying phosphorus to breeding herds, five comparable groups of yearling heifers were placed on similar and adjoining pastures July 31, 1941.

A control group received native pasturage only and another was grazed on native pasturage which had received an application of 77 pounds of P_2O_5 per acre. Of the three remaining groups, all of which were grazed on native pasturage, one had free access to feeding bone meal, one had approximately 2.6 ounces disodium phosphate to each 6 gallons in the drinking water to supply at least 6.5 grams of phosphorus daily per head and the other had free access in self feeders to disodium phosphate (20 per cent P_2O_5) after May 11, 1943.

Prior to calving in December, 1942, the group which was grazed on fertilized pasturage was significantly heavier in weight than the other groups but the other groups were of the same approximate weight. The group on fertilized pasturage also produced a higher percentage calf crop than the other groups in which there was little difference.

At weaning time in August, 1943, the group grazed on fertilized pasturage still had the advantage in weight over all other groups. The control group on native pasturage only was significantly lighter in weight than the

other groups and about 50 per cent indicated a "creepy" condition, several cases being pronounced. The group receiving disodium phosphate in water had slight advantage in weight and flesh over the groups having free access to bone meal and disodium phosphate. All of the groups receiving phosphorus regardless of source or method of supply showed to advantage over the group which had native pasturage only. The groups receiving phosphorus showed no indication of "creeps."

J. M. Jones, W. H. Black, M. B. Koonce, and J. H. Jones.

Protein Requirements for Fryers

In a series of experiments with chickens using from 14 to 22 per cent of protein in the rations, it was found that fryers fed rations containing 20 to 22 per cent protein grew out much faster and feathered smoother with fewer pin feathers than similar birds fed rations containing lesser amounts of protein. It is evident from these results that more fryers may be grown out with the same equipment during the year when feeds containing this greater amount of protein are used than when feeds containing the lesser amounts of protein are fed. Rations containing 20 to 22 per cent protein increase the profits to the poultrymen.

Melass and Sherwood.

Insecticides and Fungicides Being Analyzed

Insecticides and fungicides are now being inspected and tested to see that they are what they are represented to be. The new law became effective May 2, 1943, and is administered by the Commissioner of Agriculture with the cooperation of the State Chemist of Texas. The first report on the operations of the law was published as Circular No. 104. Both manufacturers and consumers now receive the protection of the law.

Frap.s.

Utilization of the Phosphoric Acid of the Soil Is Affected by a Number of Factors

A study was made of the factors which affect the relation of the phosphoric acid in about 375 soils to phosphoric acid removed by corn and milo in pot experiments. The phosphoric acid removed in the crops was closely related to active phosphoric acid in soils of low basicity and to total phosphoric acid in soils of high basicity. The quantities of phosphoric acid taken up were also affected by the quantities of total phosphoric acid, nitrogen, and active potash in the soils, and by the depth, basicity, and climatic regions from which the soils were taken. Phosphoric acid in the crops came either directly or indirectly from soil compounds in which the phosphoric acid was not easily soluble, since active phosphoric acid in the soils was the same before and after cropping.

Frap.s and Fudge.

Carotene in Pasture and Range Grasses

As vitamin A is essential to all animals and carotene is the principal source of vitamin A in pasture and range grasses, the crude carotene content of a number of range grasses was studied. It was found that green forages contained from 495 parts per million of carotene in Dallis grass to 2 p.p.m. in sotol bulbs. Of 62 fresh range forages, 54 would supply enough carotene to enable dairy cattle to produce butter fat high in vitamin A and to enable other cattle to store up vitamin A for future use. The crude carotene content of dried and dormant forages ranged from 2 to 94 p.p.m. During a prolonged drouth lower quantities of carotene are probably present in the dried grasses. Practically all of the dried and dormant forages would supply enough carotene for maintenance requirements of beef cattle but not enough for dairy cows to produce milk or butter fat containing high or even fair amounts of vitamin A.

Kemmerer and Fudge.

Comparative Utilization of Carotene in Vegetables

It is known that an excess of vitamin A over the quantity required for daily life can be partly stored in the liver to serve as a reserve when carotene or vitamin A in the food is too low to meet the requirements of the body. A study was made of the relative values of carotene in different foods by feeding rats a given amount of the material and measuring the amounts of vitamin A stored in the livers. Compared with purified carotene dissolved in cottonseed oil as 100, equal quantities of carotene in turnip greens had an average relative value of 15, dried apricots 12, and raw carrots 31 for storage of vitamin A in the rat livers. Cottonseed oil incorporated into the daily diet increased the utilization of carotene, but the value of the carotene in foods was still low as compared with that of carotene dissolved in cottonseed oil.

Fraps and Kemmerer.

Soil Analyses Not Needed to Recommend Fertilizers

Tests of soils for individuals are not needed in order to suggest fertilizers which may give good results. The only tests needed are for acidity. Lime should not be applied to soils unless the acidity is less than a pH of 6.0. Unless the soil has been tested and found to be acid, lime should not be used. There are a few heavy clay soils to which this does not apply.

The many chemical analyses of typical soils from all parts of Texas and the results of field experiments are being utilized to make recommendations for the use of the various grades of fertilizers sold in Texas. These recommendations are cooperative, being agreed upon by members of the various Divisions of the Experiment Station, the Extension Service, the

School of Agriculture, and the Agricultural Adjustment Administration. The recommendations for 1943-44 are published in Circular 102.

Fraps.

Energy Values of Foods and Feeds

An extensive number of comparisons of the relative values of foods and feeds by measurement of the production of flesh and fat were made with chickens and with rats. It is believed that these comparisons give more exact knowledge of the relative values of foods and feeds than data previously published. Experiments on chickens numbering 192 on 62 kinds of feeds have now been reported. There are wide differences in the energy values of the different kinds of feeds. When the energy values of equal quantities of the effective digestible constituents are considered, there are differences but usually the differences are not wide. The differences in energy values of the digested nutrients are usually within 10 per cent of those of corn meal. Oils have lower energy values than would be expected, being about 1.8 times the value of that of the nitrogen-free extract instead of the 2.25 times, which they have previously been supposed to have. The wide differences between the energy values of the different feeds are due chiefly to differences in digestibility and, to a less extent, to differences in value of the nutrients digested by chickens and rats.

Fraps.

Carotene as Formerly Determined is a Mixture of Carotenes

Since carotene is an important source of vitamin A potency, its exact determination is of considerable significance. What has been thought to be nearly pure carotene has been found to contain other compounds. A chromatographic method which employed commercial hydrated lime as an adsorbent was developed for determining the constituents of the crude carotene extract of plants. These extracts were found to contain from 3 to 40 per cent of impurity A, which consists of several pigments, 26 to 95 per cent of beta-carotene, 0 to 18 per cent neo-beta-carotene B and 0 to 27 per cent of neo-beta-carotene U, and in a few cases alpha-carotene. Biological assays showed that neo-beta-carotene B had one-half the potency of beta-carotene. The carotene solutions prepared by several widely used methods for carotene were found to contain appreciable amounts of impurities, especially neo-beta-carotene U. Methods for carotene which are now in wide use give only an approximation of the amount of pigments which have vitamin A potency. If an accurate separation is desired, a chromatographic method employing hydrated lime is necessary. The chromatographic method was applied to the analysis of a number of feeds and human foods. Factors were derived which can be used for the calculation of the amount of biologically active pigment from the crude carotene for several classes of materials.

Fraps and Kemmerer.

Vitamin A Potency of Butter

Since butter is a source of vitamin A potency, methods for the determination of carotene and vitamin A in commercial butter were developed. The amount of vitamin A potency in butters sold in Texas was ascertained. Artificial color, when present, did not interfere with the determination of carotene but interfered with the determination of spectro vitamin A. If the amount of non-carotene pigment in butter fat was over 3.0 parts per million, artificial color was considered to be present. The amount of spectro vitamin A was then corrected for its presence by determining the amount of artificial color, soluble in ethyl ether, and deducting 0.6 parts per million from the spectro vitamin A for each microgram of artificial color. The vitamin A content of commercial butter sold in Texas was ascertained for samples collected over a period of one year. The vitamin A content ranged from 21 to 53 International units with an average of 37 International units per gram. With an average pre-war consumption of 17.6 pounds per capita per year, butter would supply about 800 International units per day or approximately one-sixth of the recommended amount of 5000 units per day per adult.

Fraps and Kemmerer.

Requirements of Fryers for Different Types of Protein

With the shortage of protein from animal sources, it is imperative that information be available on the minimum percentage of protein from animal sources such as fish meal, meat scrap and dried milk required in rations to produce fryers. It was found in experiments with chickens that when the rations contain 4 to 8 per cent of feeds from animal sources, which would be 2 to 4 per cent of protein from these sources, the balance of the protein may be from vegetable sources such as soybean oil meal, cottonseed meal, and peanut meal. Under certain conditions soybean oil meal supplemented this small amount of protein from animal sources much better than other protein feeds of vegetable origin. Gain in live weight, smoothness of feathering and freedom from pin feathers were the criteria used to measure the results of this work. These studies were with rations containing adequate amounts and satisfactory kinds of vitamins and minerals.

Melass and Sherwood.

Requirements of Pullets for Different Types of Protein

In an experiment with White Leghorn pullets which had received rations containing animal protein up to 6 weeks of age the ration was changed to contain a mixture of protein feeds from vegetable sources and none of animal sources. The pullets made satisfactory gains in weight, developed good type, and laid well. Normal egg size and low mortality resulted from

a ration rich in soybean oil meal supplemented by peanut meal and cottonseed meal and containing no protein from animal sources. It is true that if the pullets are fed too much cottonseed meal, the eggs will not hold up in storage.

While additional studies are being made to learn some of the limitations of protein feeds from vegetable sources for starting rations, developing rations, and laying rations, the results so far are very significant and valuable in this emergency when the supply of protein from animal sources is so limited.

Sherwood and Carter.

Protein Requirements for Pullets

In a series of experiments with White Leghorn pullets, it was found that in growing out pullets from 8 weeks of age to maturity, rations containing 14 to 16 per cent of protein caused the pullets to grow out to good size and mature and lay within 2 or 3 weeks as soon as pullets receiving rations richer in protein. Rations rich in protein and especially in protein from animal sources often cause pullets to mature sexually and to start laying before they have reached their normal body size. This is not desirable.

Carter and Sherwood.

Texas Station Laying House

The Texas Station has developed a poultry laying house 24 feet square that should give satisfactory results in all parts of the State. This is a suitable size for a profitable flock of about 175 hens. The ventilation is provided without draft by the use of ventilators hinged at the top and by louver openings. These types of ventilators allow very little water from heavy blowing rains to enter the house. Poultry men have been pleased with this house, and it is being constructed in various sections of this State. It will be a great help to poultry men whose egg quotas have been limited because of poor houses.

Sherwood and Carter.

Feeds for Laying Hens

White Leghorn hens at Substation No. 6 at Denton when fed mixed small grains, pasture and skim milk laid as well as similar hens fed a 20 per cent protein laying mash along with the feeds mentioned above. This would indicate that the milk and pasture furnished enough food nutrients to balance the grain mixture. On the basis of this test, it is assumed that ordinary farm flocks that receive adequate amounts of milk and succulent pasture to supplement grains may not need a laying mash.

Dunkle, Carter, and Sherwood.

Improvement of East Texas Pastures

Pasture improvement work at the Lufkin laboratory has further verified the value of phosphates and clovers in improving pastures in East Texas and has resulted in as good development of cattle there as in any section of the state. Analysis of vegetation utilized for grazing purposes in such improved pastures has shown that this vegetation contains the elements necessary for full development and growth of livestock. The work at the present time is directed toward finding the treatments which, when applied to these improved areas, will maintain high feed values and offers the best means of extending this work to the different kinds and types of soil in the area.

Crouch.

New Method of Measuring Fineness of Cotton Fibers

A method for determining the fineness of fibers has been developed which is much more rapid than the commonly used weight-per-inch method. In the newer method the pressure difference produced in a manometer by air passing through a known weight of cotton compressed in a given volume is used as the measure of fineness. The finer the cotton the greater the pressure difference. The apparatus is simple, relatively inexpensive, the technique may be learned in a few minutes and the fineness of at least 25 times as many cottons can be determined in one day as by the old method. The results can be converted into weight-per-inch terms by the use of a table calculated with a regression equation based on results obtained with 96 cottons measured by the two methods. Preliminary work indicates that the apparatus can be used to measure the fineness of other fibers.

This method is being used satisfactorily and with a great saving of time in the cotton fiber studies of the Station.

A detailed description of the apparatus and its use was given in *Textile Research*, Vol. XIII, No. 1, 12-18, November 1942 and in *Textile Recorder* (Eng.) Vol. LX, No. 719, 43-46, February 1943.

Grimes.

Turnip Greens at Successive Stages of Growth

Samples of Seven Top turnip greens harvested at successive stages of growth were submitted to chemical analysis, objective test of tenderness, and judged for palatability after cooking. The youngest samples taken by thinning were much smaller than usually eaten, the oldest sample was beyond marketable age and size.

Eating quality was rated high at every stage tested. Content of water in the fresh greens decreased with growth, while protein, fat, nitrogen-

free extract, crude fiber, total ash, calcium, phosphorus, and iron increased. Stems and leaves at each stage of growth were found to have practically the same shearing strength (tenderness in raw state). Assuming one serving of cooked greens to be the equivalent of 100 grams fresh, as is suggested by this study, one serving would have supplied from 15 per cent to 33 per cent of the recommended daily adult allowance of calcium and from 10 to 20 per cent of the iron. They are valuable also as a source of bulk in the diet, but of little consequence for protein, fat, carbohydrates and phosphorus.

Whitacre.

Oats Versus Corn for Laying Hens

In a three years' study of White Leghorn hens at Substation No. 5 at Temple, oats proved to be equal to corn when substituted for it pound for pound in the mast for laying hens. There was not enough difference in egg production or mortality to indicate that in rations studied it made any difference whether ground oats or ground corn was used. No tests were made on hatchability of the eggs produced.

Hill, Carter, and Sherwood.

Hegari Equal to Corn for Laying Hens

In a three years' test with White Leghorn fowls at Substation No. 1 at Beeville, comparing hegari and corn, the hegari proved to be equal to corn pound for pound in an egg laying feed. There was no significant difference in egg production or mortality. No tests were made on the hatchability of the eggs produced from hens fed these feeds.

Hall, Carter, and Sherwood.

Closed Level Terraces Prevent Run-Off and Erosion at the Spur Substation

(In cooperation with Division of Research, Soil Conservation Service, U.S.D.A.)

For 17 years no run-off and no erosion, with \$101.50 more returns per acre for lint cotton, is the record of a field area on the Spur Station as a result of closed level terraces on land having one-half of one per cent slope. On two other areas similarly treated performance records over 14 years and 11 years have shown similar returns.

In contrast to the above and in the same period of years, cotton planted on land on which terraces had a fall of 3 inches per 100 feet with open ends lost 2.77 inches of water and yielded an average of 127 pounds of lint. Areas with level terraces and open ends lost 1.12 inches of water and produced 151 pounds of lint.

Dickson and Turner.

Control of Turkey Lice

The Poultry Division in cooperation with the Division of Veterinary Science has developed a method of applying limited amounts of nicotine sulphate directly to the body of a turkey to control body lice, similar to the method often used with chicks. One drop applied to the skin just back of the sternum effectively kills all of the lice on the bird. The treatment may be made when the breeders are being selected with very little added work. The cost is very low. This treatment is described in a recent Progress Report.

Thompson and Delaplane.

Development of a New Variety of Rice Suitable for Combining

Substation No. 4 at Beaumont has developed a very promising variety of rice from a cross between Rexoro and Fortuna. This variety gives promise of being a very desirable one for combining. Its relatively short straw and rather rapid ripening tendency, compared to Nira, are the reasons for its desirability for combining. Two of the fields grown in 1943 were combined and the grain was found to be quite low in moisture at the time of combining. Approximately 200 barrels of this seed will be planted in 1944.

Wyche.

Queen Rearing for Resistance to American Foulbrood

(In cooperation with Bureau of Entomology and Plant Quarantine, U.S.D.A., and the Iowa, Wyoming and Wisconsin Agricultural Experiment Stations.)

Queens possessing measured resistance to American foulbrood were supplied by cooperators and placed in three mating yards. In 1942, 658 progeny queens and in 1943, 756 queens were reared and distributed.

Parks.

Growing Turkeys in Confinement

Although climatic conditions in south Texas are well adapted to growing turkeys, losses have been heavy and turkeys have sometimes been of poor quality partially due to letting the poults run on the open range without supplying protection from rains and vermin and without sufficient supplement feeds. In order to study effect of more careful management, a test was conducted at Substation No. 1 at Beeville using Broad Breasted Bronze turkeys raised in confinement. For the past three years, approximately 175 birds were raised on two acres of land seeded to Sudan grass. Satisfactory mash and grain mixtures were fed free choice throughout

the growing and fattening season. It took on the average only four pounds of feed to produce a pound of gain in live weight.

Because of this test, local interest in this type of turkey production is rather extensive.

Hall and Thompson.

Progress, Uses, and Value of Detailed Soil Surveys

During this biennial period detailed soil surveys were completed of Brown and McLennan Counties, and these are being prepared for publication. Soil survey reports and maps of Maverick, Zavala, and Dimmit counties were published and distributed during this period. The completed survey of Fannin County was prepared for publication and should be issued soon. Field surveys were carried on during the biennium in Cherokee and Uvalde counties, but these have not been completed.

The data of the soil survey reports and maps have been used by various public agencies in estimating the amounts of available soils that are suitable for producing special crops especially desired in production goals. These reports have also been used in preparing basic soil data for sub-regions of the State in the report of the Post War Planning Committee for the South Central Region of the United States.

In addition to the regular surveys which provide data for publication, special surveys were made of areas of land connected with several of the substations of the Experiment Station system in order to classify the soils and thereby indicate the approximate extent of the general region to which results of the agricultural research projects will apply.

Carter and Templin.

Balanced Broad Breasted Turkeys

The Poultry Division has produced a type of balanced Broad Breasted Bronze turkeys. This type has been developed by using the good qualities of a number of strains in order to produce a bird in which the breast meat is better distributed, having greater width and depth at the back of the sternum and in which the sternum reaches back between and supports the thighs better than in any strain of broad breasted turkeys which the Division has used. These birds are able to stand up well and walk straighter than other broad breasted birds and the toms mate much more successfully than broad breasted strains which are extra heavy in front.

Males, females, and hatching eggs from this stock have been distributed over the State. There has been a real demand for them. Progress Reports and other articles have shown turkey breeders the correct type of turkey to select for most satisfactory mating results.

Thompson and Sherwood.

Schoenocaulon Drummondii, A New Source of a Potent Insecticide

(In cooperation with Wisconsin Agricultural Experiment Station and the Wisconsin Alumni Foundation)

Schoenocaulon Drummondii, commonly known as green lily, a plant indigenous to southwest Texas, has been found by the Wisconsin Experiment Station to be a good source of a potent insecticide. Cooperative arrangements have been made with the Wisconsin Alumni Foundation and the Wisconsin Agricultural Experiment Station to develop reliable methods of producing quantities of the seed from which the insecticide is obtained. Early work yielded too small amounts to be profitable, but thicker plantings give promise of profitable acre yields of seed. Yield at the rate of 150 pounds to the acre has thus far been obtained, but it is believed this yield can be doubled or more than doubled by closer planting.

Another species, *Schoenocaulon Texana*, found on the limestone hills of the Edwards Plateau, produces seed in June while the *Schoenocaulon Drummondii* produces its fruit late in the fall.

Parks.

Availability of Carotene From Different Roughage Feeds

(In cooperation with Bureau of Animal Industry, U.S.D.A.)

Dehydrated alfalfa leaf meal, grain sorghum silage, and sweet sorghum silage were compared as sources of carotene in fattening rations fed to beef steers.

Sweet sorghum sumac silage contained approximately three times as much carotene on dry basis as grain sorghum silages such as kafir and hegari. Carotene as contained in dehydrated alfalfa leaf meal was apparently more available than the carotene in silages and that in the sweet sorghum silage was also apparently more available than that in grain sorghum silage. Although the sorghum silages may be low in available carotene; when fed as the sole roughage in fattening rations, they may be expected to supply sufficient carotene to prevent ill effects from vitamin A deficiency in feeding periods of about 200 days.

J. H. Jones, Dickson, J. M. Jones.

Harvesting Rice in Texas With Combines

Binding and threshing rice is being replaced as rapidly as possible by the use of combines and driers in Texas. Growers have found that combining and drying rice requires only about 20 to 30 per cent of the labor needed to harvest by the old method of binding, shocking, and threshing.

At present the large majority of rice growers would prefer to have the self-propelled type of combine of which the 14-foot cut is the most common

size. In 1943, growers using the 14-foot self-propelled combine used an average of 2.65 man hours of labor per acre for all harvesting operations including drying and trucking from drier to market. In contrast, a total of more than 13 man hours of labor was required per acre to bind, shock, thresh rice, and truck it to market. Farmers using 6- and 7-foot pull-type combines and handling bulk rice needed 3.09 man hours of labor per acre for all operations. Due to high moisture content, rice harvested with a combine must be artificially dried before it can be stored or marketed. The use of this method of harvesting is expected to expand very rapidly providing combines and facilities for drying are made available.

Magee and McCune.

Texas Hybrid Seed Corn Increases Acre Yield

Texas hybrid seed corn from inbred strains developed by the Texas Agricultural Experiment Station has provided seed for planting approximately 250,000 acres of hybrid seed corn in 1944, or about 5 per cent of the Texas crop. Since Texas hybrid seed corn normally yields 20 per cent more than the open pollinated varieties, the present 250,000 acres of hybrid seed corn should increase Texas corn production approximately 1,000,000 bushels. It is estimated that seed will be available in 1945 for planting 600,000 acres of hybrid corn in Texas, or about 12 per cent of the Texas crop. Experiment Station results and the experience of Texas farmers who have planted the Texas hybrid seed corn indicate that we should enlarge our source of supply sufficiently to plant the acreage grown on the best corn producing lands.

McDowell, Rogers, Roberts, Hill, Dunkle, and Johnson.

Adapting Texas Cotton to War Needs.

Recent spinning tests made at the spinning laboratory at the A. and M. College operating in cooperation with the U. S. Department of Agriculture showed that the staple length in a given variety may vary as much as 5/32 inch with no significant difference in the breaking strength of the yarn. Other tests showed that yarn spun from different varieties but having the same staple varied from 107 to 77 pounds in greasing strength. It was also shown by a comparison of breaking strength of yarns of the best Texas grown cottons with several of the best southeastern grown cottons that the Texas cottons were slightly stronger even though they were somewhat shorter in staple length. Thus, it seems that the classification employed by the trade does not indicate adequately the spinning utility of cotton.

Recent variety tests conducted by the Texas Agricultural Experiment Station at Lubbock and other points throughout the state showed that certain varieties produce 15/16 inch staple or longer and yield with few exceptions as much or more per acre than varieties having a staple length

of 7/8 inch or shorter. In other words, it is possible for Texas to greatly increase the production of varieties that have high spinning utility and that would produce cotton with staple lengths 15/16 inch or longer without a sacrifice in yield.

The payment of an indiscriminate price under hog round buying in the farmers' market is the prime factor in the production of inferior cotton. Group action by growers in a single variety gin community is a positive cure for this weakness in the farmers' market.

Texas has resources peculiarly adapted to the production of cotton at a minimum labor cost. Labor requirements range as low as 20 hours per acre in West Texas to as high as 76 hours per acre in East Texas and similar areas throughout the cotton belt. In this connection attention is called to a mechanical harvester developed by the Texas Agricultural Experiment Station which has the mechanical efficiency to harvest 95 to 98 per cent of the cotton in the Plains area, reduces cotton harvesting labor about three-fourths and the total labor about one-half, and lowers the quality of cotton about one-half grade. These facts are highly significant when considered in connection with the serious shortage of farm labor.

Bonnen, Killough, Pfeiffenberger, Paulson, Jaynes, and Gabbard.

A Good Purchasing System is an Effective Method of Controlling County Expenditures

In a recent study of purchasing systems in a number of representative counties in Texas it was found that the use of a good purchasing system as compared to a poor one means a saving of 15 to 20 percent of the total annual costs of items purchased. It is conservatively estimated that \$5,000,000 may be saved by the 254 counties of the state through the use of a good purchasing system alone. The details of this study are in manuscript form and will be submitted for publication at an early date.

Bradshaw and Hervey.

Wild Turkey Research

(In cooperation with the Fish and Wildlife Service, United States Department of the Interior; the Agricultural and Mechanical College of Texas; the Texas Game, Fish and Oyster Commission; and the American Wildlife Institute)

It has been found that at least 479 species and 46 varieties of plants native to the Edwards Plateau afford potential food resources for wild turkeys. As many as 50 separate items of plant food may appear in the diet in a single season. Among important specific items are oats, wild millet, Cherokee sedge, oak mast, sorghum, elm seed, sumac, galls, and

insects. Grasses are the most important year-round food, while mast is the principal source of food from November to February.

Inadequacy of diet for wild turkeys as a result of extreme drought, accentuated by excessive livestock competition, may at times become critical and account for drastic reduction in the wild turkey population.

A wild turkey feeding program was initiated August 15, 1941, and carried through the 1941-42 season with the cooperation of 10 individual Kerr County ranchmen. It developed that feeding, using corn or milo maize or both (sometimes wheat and oats were used), with a surplus provided at all times for turkeys will cause wild turkeys to remain on ranches in Kerr County where water is abundant and favorable roosting sites are accessible, provided the turkeys are not shot into at the feeding station or at the roasts. Disadvantages of supplemental feeding are that the practice is expensive and it does not entirely make up for the shortage in natural food on the range which is so obvious a characteristic of many ranch properties in the Edwards Plateau Region.

Blakey, H. L.; Blakey, Hilda L.; Durell; Ramsey, and Taylor.

Labor Requirements and Their Distribution

In cooperation with Bureau of Agricultural Economics, U.S.D.A.)

The best information available on labor requirements and the distribution of these requirements was assembled by type-of-farming areas for each important crop and livestock enterprise. This information was published in Progress Report No. 838 and covers from 7 to 24 crops and from 6 to 7 classes of livestock for each type-of-farming area. The data are broken down for the more common sizes of power and equipment units and for irrigated and non-irrigated lands.

Cattle on feed, sheep on feed, turkeys and broilers are treated on a State basis only.

This report was prepared mainly to meet the needs of persons and agencies dealing with farm labor problems. The State Farm Labor Committee has used these data in planning to meet peak demands for labor in the various parts of the State.

Bonnen and Mullins.

New Flax Varieties Resistant to Rust

(In cooperation with Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A.)

The flax varieties, Rio and Viking, have been found to be highly resistant to rust and more cold tolerant than the old standard Bison and Punjab varieties. The Rio and Viking varieties have now practically replaced Bison and Punjab throughout the central coastal areas of the State. The Norsk variety has proved to be resistant to rust and has been released in the

Lower Rio Grande Valley, where its early maturity usually makes harvesting ahead of the spring rains possible. A variety of flax from Turkey C. K. 862, has been found to be resistant to rust and appears to be winter-hardy, at least as far north as Temple. This variety is now being increased for future release in the Central Blacklands of the State.

Flax also has succeeded as a spring-planted crop in North Texas. At Denton, the Bison variety has made an average yield of 12.6 bushels per acre during the last eleven years.

McFadden and Dunkle.

Wartime Capacity of Texas Agriculture

(In cooperation with Bureau of Agricultural Economics, U.S.D.A.)

During each of the past two years an appraisal has been made of agricultural resources in Texas in relation to estimated national needs for war vital farm products. The land resources of the State have been examined from the standpoint of their present and potential uses. Other limiting factors such as labor supply, machinery needs and supplies, and fertilizer supplies have also been examined. Problems to be encountered in expanding the production of a given product or in shifting from one line of production to another were analyzed and solutions suggested.

All analyses were pointed at determining the production pattern for the State which would result in maximum amounts of vitally needed war materials. A mimeographed report, Wartime Farm Production Adjustments for Texas, giving the results of these appraisals by type-of-farming areas was issued in 1942 and again in 1943 under the title of Wartime Capacity of Texas Agriculture. These reports were used in the establishment of State and National production goals for 1943 and 1944.

Bonnen and Mullins.

Disease Resistant Blackeye Peas

At the Tyler Station selections resistant to nematodes and Fusarium wilt have been made from Blackeye cowpeas. These strains are practically identical with the old susceptible type of Blackeye except they are resistant to these diseases and produce larger yields of seed. They should eventually supersede the old type of Blackeye. These strains are being distributed by the Tyler Station and by certified seed growers.

Johnson.

New Varieties of Wheat

(In cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A.)

Several new and superior varieties of wheat have been developed especially for conditions in Texas and are now available to wheat growers.

A variety of soft red winter wheat, named Austin, that is resistant to stem rust and leaf rust has been increased at the Temple Station and was released to commercial growers in the fall of 1942. This wheat produced yields of 15 to 30 bushels per acre in commercial fields throughout the northern, central and southern Blacklands and the Gulf Coast Prairie in 1943.

Two new varieties of hard red winter wheat, developed cooperatively by the Texas, Oklahoma, and Kansas Agricultural Experiment Stations and the U. S. Department of Agriculture, are now being distributed in the hard red winter wheat area of the State. Comanche, which is a cross of Tenmarq and Oro winter wheats, was distributed in 1942 and 1943 from the Chillicothe Station. This new bunt-resistant variety is superior to Tenmarq, a variety which is now widely grown in the State, in yield, test weight of grain, and resistance to leaf rust. It is equal to Tenmarq in milling and baking qualities. Comanche is expected to replace Tenmarq in all areas of the State where Tenmarq is grown and is especially recommended for the Rolling Plains. Wichita wheat is a selection from a cross between Early Blackhull and Tenmarq. It is being increased for distribution in 1944 from the Chillicothe and Denton stations. It is quite similar to Early Blackhull in yield and test weight but is much superior to Blackhull in its milling and baking qualities. Owing to its superior milling and baking qualities Wichita will probably replace Blackhull. It is recommended for the Rolling Plains where Early Blackhull is now widely grown.

Aonther new variety, as yet unnamed, is a selection from the cross Kanred-hard Federation x Tenmarq which was developed cooperatively by the substations at Denton and Amarillo. This strain is similar to Tenmarq in general appearance but is about 5 days earlier in maturity, resistant to leaf rust and has surpassed Tenmarq in yield and test weight of grain. Its milling and baking qualities are equal to Tenmarq. Seed of this new variety will be available in 1944 and it is recommended for the Panhandle-Plains region of the State.

McFadden, Dunkle, Quinby, Atkins, and Hill.

Sorghum Grain Can Be Stored in Trench Silos

Threshed sorghum grain with a high moisture content has been stored or ensiled successfully in trench silos with practically no loss at the Beeville Station during the last two years. Even dry grain with a moisture content of 14.7 per cent has been stored with a loss of only 1.1 per cent. This information should be of importance to grain sorghum growers, especially those who wish to feed the grain to their livestock, in the humid areas in south Texas and along the Gulf Coast.

Hall.

Urginea Martima, A Source for Red Squill

A bulb of liliaceous plant from which red squill or rat poison is produced was planted in August 1936, bloomed in 1937 and produced seed which was planted. The seedlings grew in winter and were dormant in summer the same as the old plant. In the meantime the one bulb of the parent plant had increased to five and these were transplanted. It appears that this plant can be grown successfully in Texas. It does not require cultivation with the exception of moving the bulbs. The time from seed to bulb apparently is six years.

Parks.

S. M. Tracy Herbarium Enlarged

The S. M. Tracy Herbarium here at the College, consisting of approximately 45,000 mounted specimens of Texas plants, has been enlarged during the year by the addition of 3,500 mounted specimens of the genus, *Quercus*, and the fern family. These specimens were received in exchange for information and identification.

Starter Solution Increases Yield in Tomatoes

The use of a starter solution consisting of 8 pounds of a mixture of two parts ammo-phos to one part nitrate of potash and 50 gallons of water, using 1/4 pint per plant, was found to increase yield of tomatoes by 25 per cent at Substation No. 20, Stephenville. The use of Transplantons with the starter solution increased the early yield only.

Denman.

Development of New Pasture Grasses

Cold-resistant strains of Rhodes grass that withstand temperature of 6° F. have been selected from ordinary Rhodes grass which is usually killed at a temperature of 15° F. These strains should increase the range of adaptation of Rhodes grass from its present northern limit in southern Texas to the central and northern parts of the State.

A leafy type of yellow beardgrass, *Andropogon ischaemum*, has been developed from the usual type of yellow beardgrass. This leafy type is resistant to both cold and drought. It has done well at College Station, Kingsville and Denton. It withstands heavy grazing without apparent injury.

Hensel and Brittingham.

Light Affects Cotton Fruiting

Cotton plants grown out-of-doors in the summer have produced more mature bolls than those grown in the greenhouse during the late fall and

early winter on similar levels of nitrogen and mineral nutrition. Cotton grown in the greenhouse during the spring fruited to an extent intermediate between the winter and summer plants. Increases in amounts of available nitrogen during the summer resulted in increases in the number of mature bolls but these beneficial effects of the nitrogen were much less marked in the winter-grown plants. With a similar level of nutrition, the smaller number of mature bolls per plant on the winter-grown plants was associated with higher shedding rates, as compared with summer plants. These seasonal differences are attributed to variations in light conditions, possibly associated with differences in light intensity. In continued experiments, shading of cotton plants for a few days at a time during the fruiting period has caused increased shedding and reduction in number of bolls matured under a variety of conditions. Certain varietal differences that have been noted among varieties of upland cotton in regard to response to unfavorable (for fruiting) light conditions, suggest the importance of considering the adaptability of variety to local light and weather conditions, if maximum yields are to be obtained.

Dunlap.

Trials With Rubber Plants

(In cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A.)

Plantings of guayule did well at the substations at Ysleta, Balmorhea, Weslaco, Winter Haven, Beeville, Temple, and Chillicothe but did not survive the excessive moisture at Angleton. *Cryptostegia* made good growth at Angleton, Beeville, Winter Haven and College Station but was killed to the ground by temperatures of 20° to 25° F. in December 1943. Two species of Russian dandelion, *kok-saghyz* and *krim-saghyz*, germinated poorly and satisfactory yields were not obtained. Goldenrod made good growth at College Station, Angleton, Beeville, and Winter Haven.

Reynolds and Potts.

Soil Moisture and Nitrogen Affects Cotton Fruiting

In pot-culture studies with cotton, increases in the number of bolls per plant have been in proportion (within certain limits) to the amounts of either water or nitrogen (ammonium sulphate) added to the soil. The increases obtained by applying nitrogen to relatively dry soils, however, have been smaller than those obtained by the use of adequate water alone. The largest numbers of mature bolls have occurred where sufficient nitrogen has been added together with adequate water to keep the plants from wilting at all times. The percentage of bolls that were shed has been fairly uniform in the various treatments. Marked increases in shedding have been obtained, however, when high-nitrogen plants have been changed from a high to low moisture level after the plant had at-

tained a good size and had developed many immature fruiting forms. These studies may have a direct bearing in the field upon the utilization of nitrogen supplied by fertilizers or legume cover crops.

Dunlap.

Rural Families Produce Considerable Portion of their Food Supply

A survey of the food supply of 400 families in 5 counties representing three regions of the State showed that the kinds of food used in different regions were surprisingly similar and appeared to furnish a good diet to at least three-fourth of the families. Home production was the most important source of food for owners and renters while day laborers purchased somewhat more food than did the other groups. The general trend seems to have been toward a more adequate diet than seemed to be the case in 1929. The consumption of milk, butter, eggs, vegetables, and whole cereals was approximately doubled.

Whitacre.

Lateness in Blooming of Peaches Affected by Breeding Practices

It has been found possible to combine moderate cold requirements with high heat requirements in the same tree. This gives a late blooming tree that bears well in a mild climate. Five selections have been made for extensive testing as home orchard varieties in the southern part of the State. All produced well after experiencing a temperature of 17° F. on March 3, 1943. The selections are early white freestones of good dessert quality. These and others have been backcrossed to early yellow freestones to secure mild climate peaches of commercial value.

Yarnell and Morris.

A New Variety of Broccoli Developed

An inbred selection of Green Sprouting broccoli holds promise as an early type with small buds and compact heads free from leafiness. Further selection is being made at the Lower Rio Grande Valley and the Winter Garden Substations to fix the desirable characters.

Flory.

Larger Sized Summer Tomatoes Produced by Breeding Methods

The size of Summerset is being increased without marked reduction in late summer production by crossing with Bison and Stokesdale at the Winter Garden Station. Porter and Porter Improved gave the highest yield for the entire season, and Stokesdale had the highest per cent marketable fruit at Substation No. 20, Stephenville. The early northern varieties such as Bison, Victor, Bounty, Earliana, and Nystate are best

adapted at the Wichita Valley Station. Bison has a better shaped fruit when grown in the northern than in the southern part of the State. Valiant has shown up very well as a first early home garden variety at College Station over a two-year period. Stokesdale and Pritchard are competitors for second early. Both outyield Marglobe and Rutgers.

Hawthorn, Denman, Pickett, and Yarnell.

Yields Increased by Proper Placement of Fertilizer

Recent work at the Winter Garden Station reveals that the machine placement of fertilizer below the plants increased the yield by 22 per cent as compared with broadcasting the same amount of fertilizer.

Hawthorn.

Potato Yields Increased by Prolonging Growth of Plants

Experiments conducted by the pathologist at Substation No. 15, Weslaco, demonstrated that yields of Irish potatoes for the "new potato market" can be materially increased by postponing the digging operation from one to two weeks. Late irrigation, weed control, and dusting for the control of foliage diseases are essential for the production of maximum yields during an average spring season. Price relationships are operative in determining whether or not practical application can be made of this information.

Godfrey and Friend.

New Varieties of Rice

(In cooperation with U.S.D.A.)

The Blue Rose strain, T. S. No. 7183, released in 1941 was grown on several thousand acres in 1943 and it is estimated that well over 50 per cent of the Blue Rose acreage of Jefferson, Chambers, and Liberty Counties are to be sown in 1944 with this particular strain. All of the growers who have grown this variety consider this strain to be superior in vigorous growth with higher yield. The experimental results recorded at the Experiment Station over a period of years show T. S. No. 7183 to yield higher than commercial strains grown.

Texas Patna is a very popular long grain variety recently developed by Substation No. 4 at Beaumont. This variety is very similar to Rexoro, one of the parent varieties that is very popular in Louisiana and Texas, excepting that it matures approximately fifteen days earlier. This variety was grown on about 2,000 acres in 1943 and the present indications are that at least 15,000 acres will be grown in 1944.

Wyche and Beachell.

Large Yellow Tomatoes for East Texas

The mild flavor of yellow tomatoes makes them especially desirable for preserves in addition to their attractiveness on tables. Hence, yellow tomatoes are grown extensively in home gardens. Golden Queen and Yellow Ponderosa varieties are unsatisfactory because of their low yields and serious susceptibility to *Fusarium* wilt. To develop a variety of yellow tomato adapted for use in East Texas, T550 was crossed with Pan America. The second and third generation selections gave good yields of large yellow globe fruits on large vigorous vines. Both parents had the dominant character for wilt immunity so the new yellow hybrid, T880 is expected to be immune to wilt.

Young.

Blackeye Pea No. 8152 Resistant to Root-Knot

This selection was tested in comparison with Purplehull pea in soil that is abundantly infested with root-knot nematodes that had lived on tomatoes in the preceding 8 years. Root-knot damaged Selection No. 8152 only half as much as Purplehull. Also, 55 per cent of the Purplehull pea plants had ashy stem blight caused by *Sclerotium bataticola* while only 6 per cent of the No. 8152 plants had this disease, which indicated resistance to this disease.

Young.

Tillage and Fertilizer Experiment on Root Rot

(In Cooperation with U.S.D.A.)

The effect of early fall flat breaking of cotton land with or without the addition of nitrogen fertilizer (organic or inorganic) was studied in an experiment on root rot (*Phymatotrichum omnivorum*) infested soil in Washington County. The operations connected with flat-breaking and application of the fertilizer were performed in mid-September, 1941, immediately following the harvest of the preceding crop of cotton. The land was bedded the following March and planted to cotton in April. Root rot was severe throughout all treatments and although the treatments involving flat-breaking plus nitrogen showed a lower percentage of diseased plants than the check treatment, the difference was not significant statistically. The highest yields occurred with treatments receiving flat-breaking plus nitrogen fertilizers followed by flat-breaking alone while the check areas (late bedding only) gave the lowest yields. The three treatments involving flat-breaking plus nitrogen gave significantly better yields than the check treatment.

Blank.

Soil Acidity and Growth of Rose Cuttings

Highly acid soils reduce both growth and life of rose cuttings. Preliminary evidence indicates that injury was caused to rose cuttings at a pH of 4.9 - 5.1 or below; normal live but reduced growth at 5.1 - 5.2, and normal growth above 5.2. Chief effect on the plant of the acid soils is injury to roots causing a killing and blackening of the surface. Additions of lime to correct this acid condition stimulated new growth almost immediately and indications are at present that where much fungicidal sulfur is applied to plants on acid, lightly buffered, soils lime will be needed to counteract the deleterious effect.

Watson.

Peach Adaptability Tests

(In Cooperation with Texas Extension Service)

Recommendations of early varieties of peaches as a result of the test at Substation No. 11, Nacogdoches, have been of considerable use to planters of commercial and victory home orchards. Listed in order of ripening, they are Fisher, Sunbeam, July Gold, Radiance, Veteran, Halehaven, Viola, Gold Medal, Brackett, Hazel, and Gage Elberta (Progress Report 823). Attention should be called to the following peach varieties from the promising seedling test: a very early yellow semi-cling of good dessert quality from C. W. Cartwright of Terrell; one of the earliest yellow free-stone peaches of good quality from A. A. Schilling of Bastrop; and an early yellow cling excellent for pickling from James Schulz of Killeen. Among the highest quality peaches when quick-frozen are Gage Elberta, Short, J. H. Hale, and Mikado.

Morris, Ratsek, Rosborough, and Yarnell.

Cotton Varieties, Fertilizers and Root Rot

(In Cooperation with U.S.D.A.)

In experiments in Washington and Burleson Counties for three years the early maturing varieties have outyielded the late maturing varieties by a highly significant margin although the amount of disease in the two groups did not differ significantly. A high nitrogen fertilizer reduced the amount of root rot and increased yields by a highly significant margin. A high phosphate fertilizer had almost no effect on the amount of disease in cotton on the Houston black clay in Washington County, whereas on Crockett clay loam in Burleson County the amount of disease was increased where phosphate was used. The yield of cotton was increased by the use of the phosphate fertilizer only in the latter soil.

Blank.

Relation of Soil Microorganisms to the Severity of Root Rot of Cotton

(In Cooperation with Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A.)

New evidence has been developed that saprophytic soil and root surface microorganisms play an important part in lessening the seriousness of the root-rot disease.

1. Corn is normally immune to root rot but it has been found that this plant when grown without its normal complement of root surface bacteria on sterilized sand-bentonite substrates is rapidly attacked and killed when the root-rot fungus is introduced.

2. Heavily fruited cotton plants are more susceptible to root rot than are plants from which the bolls have been removed. The removal of bolls results in increased sugar concentrations in the roots and in turn in marked changes in the numbers of bacteria supported on the root surfaces.

3. The acidity of certain Texas soils encourages the growth of microorganisms that are destructive to the root-rot fungus. The root-rot fungus makes a poor growth on acid Wilson soil as found in the field but following either the addition of calcium carbonate to neutralize the acidity, and thereby alter the microflora, or following steam sterilization which does not greatly change the acidity but does destroy other organisms, the fungus makes a rapid growth. Previous investigators have found that the addition of manures and crop residues to soils encourages the growth of antibiotic organisms and lessens the severity of root rot.

Eaton, and Rigler.

New Method Developed for the Determination of Free Gossypol in Cottonseed Meal

A new method for accurately determining extremely small quantities of free gossypol in cottonseed meal has recently been developed at the Texas Station. The method is easily followed and involves no detailed, difficult procedures. This new test gives the manufacturer a method for determining the quality of cottonseed meal as measured by its content of free gossypol. Cottonseed meal low in free gossypol is preferred in rations for swine.

Lyman, Holland, and Hale.

Large Fruited Red Tomatoes Immune to Fusarium Wilt

Selections of crosses between commercial and currant tomatoes made at the Missouri Station were crossed with Marglobe and Rutgers and further selected for five generations for adaptability and resistance to

fusarium wilt, As the fruit then averaged only five ounces, additional crosses were made with Pritchard, Oxheart, and T 723 to increase the size of fruit. Later selections combining large fruits with good quality will be introduced for commercial planting in East Texas.

Young.

Green Pasture Saves Protein Supplement Feeds in Swine Rations

When growing and fattening pigs had access to green oats pasture or green Sudan pasture, they required from 40 to 50 per cent less of high protein supplement feeds, and 5 per cent less grain than similar pigs required when fed without pasture. One acre of green pasture will save from 300 to 500 pounds of protein supplement in a 90-day grazing period, when the pigs are self-fed, and the pasture is grazed at the rate of 18 pigs per acre.

Hale.

Sunn, Jute and Kenaf as Fiber Crops in Texas

(In Cooperation with U.S.D.A.)

Because of threatened shortages in 1942 of imported cordage and bagging fibers, investigations were undertaken to determine the possibilities of producing certain of these or substitute fibers in Texas. Attention was directed in 1942 principally to *Crotalaria juncea* (the Sunn fiber of commerce and a promising legume green-manure crop in southern United States) and jute (*Corchorus capsularis* and *C. olitorius*). Plantings of these crops were made at Angleton, Beaumont, College Station (Brazos bottom land), and Weslaco. In 1943 kenaf (*Hibiscus cannabinus*) was also included in the plantings. Yields of Sunn fiber as high as 1800 pounds per acre and of jute fiber as high as 3500 pounds were obtained under irrigation at Weslaco. Without irrigation at the other stations yields of 1400 pounds of Sunn and of 1600 pounds of jute were found to require fertile soils and especially favorable rainfall. The kenaf made a good growth at all locations in 1943 and fiber yields of 800 to 1200 pounds per acre are indicated as possible. Under the normal competitive conditions of world commerce it appears improbable that the net returns from any of these crops would make their planting attractive to Texas farmers. As grown in India, the jute and Sunn fibers are separated by hand after partially decomposing the stalks under water. Satisfactory fiber was not obtained in the foregoing trials by machine decortication after dew retting on the land. Kenaf lends itself somewhat better to dew retting and machine decortication, but economic factors make its commercial production in Texas improbable except possibly under exigency.

Eaton.

New Method Developed for the Determination of Amino Acids in Feeds

A microbiological method for the determination of amino acids in feeds was developed during the past year. This new method will enable scientific workers to obtain a better knowledge of the kind and amounts of amino acids contained in feedstuffs. Such information will be valuable to livestock feeders in helping them to select protein feeds according to the quality of protein.

Kuiken, Lyman, Hale, and Blotter.

Requirements for Brood Sows and Fattening Pigs For Vitamin A

For long time production, brood sows receiving 1350 units of vitamin A potency (in the form of alfalfa leaf meal) per pound of feed maintained better health, and produced stronger pigs than did sows receiving lower levels of vitamin A.

Growing and fattening pigs made satisfactory gains and stayed in good health when fed rations containing 900 units of vitamin A potency per pound of feed.

Hale and Fraps.

Sulphur and Other Fungicides for Control of Peanut Diseases

Three applications of dusting sulphur increased the yield of hay and peanuts in one trial where *Cercospora* leaf spot was severe in 1942. Two applications of dusting sulphur gave satisfactory control of peanut rust (caused by the fungus, *Puccinia arachidis*). Among the 300 selections and varieties of peanuts tested, marked differences in susceptibility to southern blight (*Sclerotium rolfsii*) were noted in certain strains.

Marked increases in the yield of peanuts in 1942 were obtained by dusting with 325-mesh dusting sulphur through the control of *Cercospora* leaf spot. Comparable increases were obtained likewise in the yield of peanut hay from the dust treatments. Sulphur-copper dust (90 parts 325-mesh dusting sulphur : 10 parts Tenn. Copper No. 34) was somewhat more effective for controlling peanut leaf spot, in a single test, than was 325-mesh dusting sulphur used alone.

In 1943 peanuts shelled by hand and planted at the rate of 1 seed every 6 inches in the row gave a better stand of plants than unshelled seed (whole peanut, usually with 2 seeds) planted in the same manner. Treatment of either shelled or unshelled seed with fungicidal seed protectants (Arasan, Spergon, 2 per cent Ceresan, Dow No. 5 and Cuprocid) did not materially improve the stand of plants in this well-replicated test.

KenKnight, Harrison, and Dunlap.

New Varieties of Cotton Developed

New varieties of cotton with good spinning performance have been developed for different parts of the state.

Suntex and Dentex are new varieties that have been developed by in-breeding and selection from Sunshine Rowden at the Denton Station. They are being released for commercial production. These varieties produce high yields, are storm-proof and are well adapted to central and north central Texas.

The Chillicothe Station has developed (Mebane 140) Lockett 140 and Western Prolific (Mebane 141) which produce high yields of medium length fiber. At present price differentials these varieties are probably as profitable or more profitable than are the longer staple varieties for the western part of the State. They are well suited to the rolling plains where they are grown perhaps on one-half million acres.

The Lubbock Station was instrumental in creating a new variety of cotton, called Stormproof, which produces large yields of cotton with good cleaning and spinning properties and is especially adapted to machine harvesting. It was grown on 225,000 acres in 1943 and probably will be grown on 400,000 acres on the High Plains in 1944.

Mebane 804-50, a high-yielding variety of cotton with a medium length of staple, has been developed at the Beeville Station. It is one of the better varieties at Beeville and is being grown extensively in the lower Gulf Coast Region of Texas.

Killough, Dunkle, Quinby, Jones, and Hall.

A Manufacturing Method for Eliminating Toxic Qualities of Cottonseed Meal

Satisfactory conditions were found by workers at the Texas station for the processing of cottonseed meal in which no indication of toxic qualities could be detected by either guinea pig or swine feeding tests. The meal was prepared by the hydraulic method. Meal manufactured according to this process contains practically no free gossypol.

Lyman, Holland, and Hale.

Hubam Clover Greatly Reduces the Early Attack of Root Rot in the Blacklands and Increases Yield of Cotton

Hubam clover at the Substations in Temple and Denton when followed by cotton the succeeding year, has given marked increases in acre yield of cotton particularly by delaying the attack of root rot. The use of Hubam and perhaps other sources of nitrogen and organic matter is recommended throughout the Blackland region and affords a means of rejuvenating the soil and decreasing the effects of root rot. Hubam also can be used for hay and seed, which at present commands a good price.

Hill and Dunkle.

Soybeans Do Well Under Irrigation in West Texas

(In cooperation with the Bureau of Plant Industry, Soils and Agricultural Engineering, U.S.D.A., and the U. S. Regional Soybean Laboratory.)

During 1942 and 1943 seed yields of several varieties of soybeans grown under irrigation at Lubbock, Weslaco, and Ysleta ranged up to 40 bushels per acre. These yields compare favorably with the yields obtained in the regular soybean-producing region in the north central states, but are perhaps higher than could be expected over a period of years. Ogden, Macoupin, and Arksoy have been the highest yielding varieties under irrigation. At Weslaco, in the lower Rio Grande Valley, fall planting has given higher yields than spring planting. At other stations where soybeans are not grown under irrigation low yields have been obtained.

Manke, D. L. Jones, Lyerly, and Friend.

Cytogenetics and Improvement of Cotton

(In cooperation with Bureau of Plant Industry, Soils, and Agricultural Engineering, U.S.D.A.)

The adaptation to cotton of the colchicine technique whereby heretofore difficult or impossible hybrid combinations can be made and fertility can be induced in otherwise sterile hybrids has opened up a new field in cotton genetics and breeding. Using methods involving this technique, a genetic study of the taxonomic relationships of cotton species is well on its way to completion. Studies of plants with more than the basic number of chromosomes afford a direct method of determining the effects on American Upland cotton of chromosome balance and the effects of genes introduced from wild or distantly related species. Four plants with an extra pair of chromosomes (26×11) were recovered in 1943. This, so far as is known, is the first occurrence of this phenomenon in cotton.

Since fertile hybrids between cultivated American 26-chromosome cottons and wild or cultivated 13-chromosome cottons can be made almost at will, it is now possible to utilize a vast number of economic characters carried in the latter types. One of these characters, fiber strength, is of particular importance at present; and while average upland cotton gives a breaking strength of approximately 80,000 pounds per square inch, productive lines which break at 100,000 to 119,000 pounds per square inch have been recovered from species hybrids.

Richmond, Brown, and Manning.

Plowing Under Legumes Increase Yields of Cotton and Corn

At Tyler in 1942 and 1943 plowing under vetch, fertilized with superphosphate and potash, practically doubled the yield of corn and increased

the yield of cotton 80 per cent as compared with yield on unfertilized land. Plowing under fertilized vetch at Nacogdoches increased the yield of cotton 60 per cent. Although cotton in the experiments at College Station was a practical failure in 1943 due to extreme drought, fertilized vetch has increased the yield of cotton 43 per cent during the last seven years. During 1942 and 1943 at Temple cotton following Hubam produced an average yield of 317 pounds of lint per acre, or more than double the yield of 153 pounds of cotton grown on the same land every year. Hubam clover greatly reduced the root rot of cotton from 39.8 per cent in cotton following cotton to 6.6 per cent in cotton following Hubam clover.

The practices developed in these experiments at College Station, Nacogdoches and Tyler are already in extensive use in East Texas, where approximately 150,000 acres of winter legumes were planted for soil improvement in 1942. The results obtained at Denton and Temple are applicable generally to the millions of acres in the Blackland Prairie.

Reynolds, Manke, Rea, Johnson, Hill, Dunkle, and Morris.

Emerald, A New Variety of Sweetclover Developed

A new forage variety of annual sweetclover called Emerald has been developed by hybridization with Hubam clover. This new clover has finer and more stems than Hubam clover and is much more leafy. It is being increased at Weslaco for distribution in southwest Texas, where preliminary trials have shown it to be superior to Hubam which is well adapted to the soils and agriculture of the region. Its good forage qualities make it more suitable than Hubam for hay and grazing and completely satisfactory for soil improvement.

Manke and Friend.

Variety Testing of Cotton and Corn at Substation No. 2 Tyler

The Stoneville 2B cotton has given better average yields for the past three years than any other variety of staple cotton, though not as much as Hibred. The general use of Stoneville 2B cotton is increasing.

Texas Hybrid No. 12 corn has out-yielded all other common hybrids or open pollinated varieties and is recommended for good upland soils where a yellow, large ear corn is wanted. Texas Hybrid 7-W is a good white corn. Under conditions of favorable soil moisture and fertility the open pollinated Hastings Prolific (white) and Texas Golden Prolific (yellow) have produced better yields than other open pollinated sorts and only slightly less than the hybrids.

Johnson.

Maintaining Color of Roses

Studies have shown that intensity of bloom color of roses depends upon available carbohydrates. Factors adversely affecting photosynthesis such as chlorosis, defoliation, and high temperature result in light colored blooms. The nurseryman, florist, and amateur can use the knowledge as a tool for better production. When blooms are abnormally light colored some one or several of the following operations might be resorted to in building up carbohydrates in the bush. Dust or spray for blackspot to prevent defoliation. Reduce temperature or water or nitrogen or all three. Pick blooms with few or no leaves and disbud. Remove all blooms before they shatter.

Ratsek.

A New Use for Dried Rose Buds

Preliminary cooperative tests with Schieffelin and Company have indicated the possibility of using buds of Texas roses for medicinal purpose. Buds are picked without the calyx and dried until air dry. At prevailing prices this can be a profitable sideline for the grower.

Ratsek.

Essential Oils from Native Plants

(In Cooperation with Engineering Experiment Station)

At the Tyler Substation cooperative studies with the Texas Engineering Experiment Station on the recovery of oils from native plants have uncovered several commercial possibilities. *Monardia fistulosa* (Horsemint), *Prunus laurocerasus* (Cherry Laurel), *Solidago odora* (Goldenrod), and *Pucnanthemum incanum* (Mintweed) all were found to have commercial possibilities. The last named species is particularly promising in that it is high in pulegone and can replace imported oil of pennyroyal. Studies this coming year will be made to determine the cost of production of this product when grown as a field crop to be harvested with a binder. Based on the price paid for pennyroyal in normal prewar times, on the amount of oil recovered (.99%), and on the large amount used by the drug store trade this Mintweed has good possibilities for the East Texas farmer.

Ratsek.

Development of Methods for Safe Processing of Home Canned Meats

If meat has been contaminated with soil containing the spores of *Bacillus Clostridium Botulinum* (possible under even the best of farm slaughtering conditions) and if it is not heated for a long enough time at a high enough temperature during canning, botulinus poisoning may result when the canned meat is eaten. As a safeguard against this, very long processing periods are frequently recommended, some of them so long that home-makers have refused to use them.

Experimental work to determine the shortest safe processing periods for meat in tin cans and glass jars has been completed and published as Station Bulletin 635. It was found that processing periods considerably shorter than those usually recommended are safe if the directions given are followed. These safe but shorter processing periods are being used in demonstrations by the Texas Extension Service and are proving helpful in the home canning part of the Victory program.

Cover.

Control Methods for Cotton Insects are Effective and Practicable

The control of flea hoppers in cotton can be effected by the use of sulphur applied in the earlier stages of infestation at the rate of 12 to 15 pounds per acre.

Its use is relatively simple and easy and is effective when the temperatures are reasonably high. Less effective results are secured when the weather is cool and cloudy.

Boll weevils and leaf worms can be controlled readily by the use of calcium arsenate at the rate of 5 pounds to the acre. One application is usually sufficient for leaf worms until the broods overlap but three applications at 7-day intervals are oftentimes required to control boll weevils.

The boll worm can be controlled by the use of calcium arsenate, cryolite, arsenate of lead, or basic copper arsenate and sulphur 1 to 2 at the rate of 10 to 15 pounds per acre usually made in three applications 5 days apart. The first application for boll worms should be made when the young worms are about $\frac{1}{8}$ inch in length and the succeeding application should not be delayed longer than 5 days since the young boll worms grow very rapidly. When boll worms reach a size of $\frac{1}{2}$ inch in length or greater, the application is less effective and may not kill them.

Most applications of any dust should be made when the atmosphere is still. Rainy conditions may prevent applications and exercise of good judgment is necessary in order to avoid waste of the poison and increase in the excessive cost of control.

In the control of these cotton insects, exact and precise instructions must be followed if control is effected.

Thomas, Fletcher and Owen.

Texas Selection of Porto Rico Sweet Potato Shows High Yield and Good Quality

The Texas Porto Rico, a selection made at the Sweet Potato Laboratory at Gilmer, Texas, has been released to more than fifty growers and has proven satisfactory according to reports received. For the four year period 1940-43, the Texas Porto Rico has averaged 250 bushels per acre compared with 232 bushels for the La. Unit 1, Porto Rico. Yields for other strains of

Porto Rico were less than 200 bushels per acre. Every grower can improve his Porto Rican seed stock by selecting roots of medium size which are free from disease and by nicking the shoulder on the stem end to eliminate off-colored mutations to standardize the deep orange flesh.

Wright.

Sweet Sudan, A New Valuable Grazing Crop

A sweet stemmed Sudan has been developed at the Chillicothe Substation and increased distribution. Sweet Sudan is eaten by livestock in preference to ordinary Sudan and is considered to be a strain of extraordinary value as a grazing crop. By the use of breeding methods a sienna color has been imparted to the glume or hull so that this strain can be recognized by the farmer by the color of the hull. It is immune from some of the stem and leaf diseases that affect Sudan grass in parts of the state and this factor can greatly increase its used and utility for grazing purposes.

Quinby and Karper.

Early Grano Onion for the Winter Haven Area

The Early Grano onion developed by the Substation at Winter Haven with U. S. Bureau of Plant Industry promises to be of great value as it produces a heavy acre yield and is about two weeks earlier in maturity than other strains, which gives it an advantage in marketing. The yield of this selection in 1940 was at the rate of 724 bushels per acre. The Early Grano onion has been produced by reason of the fact that earliness in the onion is a recessive factor and therefore could be quickly established in purity for earliness. Seed fields are being grown in the El Paso Valley and the Pecos area from stock furnished by the Winter Haven Station, which should provide supplies of seed to the onion growers of southwest Texas. The war activities have made it very difficult to secure good imported seed of the onion, and this development should add materially to the source of high quality seed.

Hawthorn and Mortensen.

Rust Resistant Small Grains Find Favor with Growers

Three rust resistant small grains, the Rustler oat, Austin wheat, and Tunis barley, developed by the Texas Station in cooperation with the U. S. Department of Agriculture have found particular favor among farmers in the Gulf Coast area, where leaf rust has been the principal deterrent to the growing of small grains. Not only are these strains good grain producers but they fill a much needed place as winter grazing crops especially in times of protein shortages. The use of such winter grazing crops has an intimate relation to livestock production in the south Texas area where production of livestock is one of the major activities.

McFadden and McDowell.

Mechanical Harvesting of Cotton Greatly Reduces Cost

The harvesting of cotton with a roller type stripper using a principle developed by the Texas Station showed a harvesting cost of \$3.13 per bale against a cost of \$30.00 per bale when the cotton is hand pulled, a saving of \$26.87 per bale.

Smith and D. L. Jones.

Mesquite Eradication

(In Cooperation with Soil Conservation Service, U.S.D.A.)

A recent method of eradicating mesquite developed at the Spur Station offers considerable promise. It consists of cutting the topwood at the surface of the ground with a brush saw, which is a cheap operation, and then letting the stumps put out sprouts. The sprouts are subsequently sprayed with a solution of sodium arsenite. Results have shown effective kills of sprouts and stumps when spraying is done in cloudy weather following a rain. Spraying in dry windy weather is ineffective. Results indicate that spraying must be done under high humidity. Sodium arsenite is highly poisonous to livestock and stock should be withheld from areas being treated until two or three inches of rain have occurred after poisoning.

Dickson and Fisher.

Machine Harvesting of Corn

The results of tests made in 1943 showed that the efficiency of machine harvesting was affected more by the date of harvesting than by the varietal characteristics. The average moisture content of corn harvested August 23 was less than 14 per cent, indicating that early harvested corn can be safely stored and fumigated for control of weevils.

H. P. Smith.

Practical Farm Slicer for Sweet Potatoes

During the sweet potato harvest season of 1942 and 1943 cull sweet potatoes at the Sweet Potato Laboratory at Gilmer, Texas, were sliced and sun-dried for livestock feed since this grade cannot be stored fresh economically. To facilitate this method of drying, an inexpensive slicing machine has been developed at the Laboratory. The machine will slice from one to two bushels of sweet potatoes per minute and can be built by any good blacksmith. This method of utilizing low grade sweet potatoes for feed has been adopted by several farmers in this area and interest is increasing.

Sweet potatoes can be grown and processed economically for stock feed, and the practice is expected to include other crops such as stock beets.

Wright.

Gulf Coast Prairie Vegetation Deficient in Phosphoric Acid

Forage grasses in the Gulf Coast Prairie do not contain enough phosphoric acid for growing range cattle. Forage grasses are also likely to be deficient in protein during the winter months. Protein, phosphoric acid, and lime were determined on 1140 samples of forage collected during different seasons of the year from ranges in the Gulf Coast Prairie. Phosphoric acid was deficient in 59 per cent of the samples of young grasses and 96 per cent of the samples of mature grasses. Protein was deficient for maximum growth of grazing animals in 12 per cent of the samples of young grasses and 92 per cent of the samples of mature grasses. Lime was adequate or high in 82 per cent of the samples. Protein and phosphoric acid averaged lower in samples from soils of the Hockley-Katy group than in those from the Lake Charles group of soils. Protein and phosphoric acid in samples of young grasses increased with an increase in either nitrogen or active phosphoric acid in the soils. Mowing of the pastures increased considerably the value of the pasturage in phosphoric acid because of the renewed growth that follows the mowing. Fertilization with superphosphate often increased both the yield of grass and the percentage of phosphoric acid in it. Maximum animal production over most of the area can be secured only when the forage is supplemented by feeds carrying phosphoric acid over most of the year and phosphoric acid and protein when the forage is mature. Since phosphoric acid is usually fed as a calcium phosphate, and the percentage of lime is usually good or high, supplementary feeding of limestone or oyster shell is not necessary. The adoption of range improvement practices, such as the introduction of legumes and better species of grasses, mowing, and the fertilization of pastures with superphosphate, may considerably reduce the need for such supplementary feeding or render it entirely unnecessary.

Fraps and Fudge.

